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Acute Effects of Oblique Sling Exercise on Core Stability and Trunk Muscle Strength in Healthy Adults: A Comparative Experimental Study

Dr Prem Patel[1], Dr Tvisha Patel[2], Dr Sachi Mevada[3], Dr Zarana Khamar[2], Dr Yashasvi Dave[5]

[1]Intern, Arush Physiotherapy College, Shahibaug, Ahmedabad, Gujarat, India.
[2,4]PhD, Associate Professor, Arush Physiotherapy College, Shahibaug, Ahmedabad, Gujarat, India.
[3,5]PhD Scholar, Assistant Professor, Arush Physiotherapy College, Shahibaug, Ahmedabad, Gujarat, India.

Abstract

Background: Core stability is essential for maintaining trunk control, postural alignment, and efficient functional movement. Oblique sling exercises, based on integrated myofascial chains, are increasingly used to enhance neuromuscular coordination and dynamic trunk stability. However, evidence regarding their immediate effects on core and trunk muscle performance remains limited.

Objective: To evaluate the immediate effects of oblique sling exercises on core strength, trunk muscle strength in healthy individuals.

Methods: A comparative experimental study was conducted on 43 healthy participants. Baseline measurements of core strength and trunk muscle strength were assessed using standardized tools. Participants performed a single session of oblique sling exercises consisting of three sets of ten repetitions, targeting both anterior and posterior sling systems. Post-intervention measurements were recorded immediately after the exercise session.

Results: The findings demonstrated a significant immediate improvement in both core and trunk muscle strength following the intervention. The improvement was more pronounced in core strength compared ($p=0.01$) to trunk strength ($p=0.03$), indicating greater activation of deep stabilizing musculature. These results suggest enhanced neuromuscular efficiency and improved stabilization capacity after a single exercise session.

Conclusion: A single session of oblique sling exercises leads to rapid improvements in both core and trunk strength, with a greater effect on core musculature. This highlights the effectiveness of oblique sling exercises in enhancing core stability and supporting postural control.

Keywords: Oblique Sling Exercise, Core Strength, Trunk Stability, Neuromuscular Control

Introduction

Core stability plays a crucial role in maintaining postural control, balance, and efficient functional movement. It involves the coordinated activation of deep and superficial muscles of the trunk, including the transversus abdominis, multifidus, diaphragm, and pelvic floor muscles, which collectively contribute to spinal stability and load transfer during movement (1). Impairments in core stability have been

associated with poor posture, reduced functional performance, and increased risk of musculoskeletal injuries (2).

The concept of myofascial chains has gained increasing attention in recent years, emphasizing the interconnected nature of muscles through fascial linkages (3). Among these, the oblique sling systems—comprising anterior and posterior chains—are particularly important for rotational stability, force transmission, and dynamic movement control (4). The anterior oblique sling connects the external oblique, contralateral internal oblique, and adductors, while the posterior oblique sling links the latissimus dorsi with the contralateral gluteus maximus via the thoracolumbar fascia (5).

Oblique sling exercises are designed to activate these interconnected muscle chains, thereby enhancing neuromuscular coordination and dynamic trunk stability. These exercises are widely used in sports training and rehabilitation programs, particularly for individuals with low back pain or functional instability (6). Despite their widespread application, there is limited empirical evidence evaluating their immediate effects on muscle performance, especially in healthy individuals.

Most existing studies have focused on long-term adaptations following core stabilization programs, with relatively few investigating acute neuromuscular responses (7). Understanding the immediate effects of such exercises is important for clinicians and physiotherapists, as it can guide exercise prescription during early rehabilitation or warm-up protocols.

Therefore, this study aims to evaluate the immediate effects of a single session of oblique sling exercises on core strength and trunk muscle strength in healthy individuals.

Methodology

Study Design

A comparative experimental study design was employed to evaluate the immediate effects of oblique sling exercises on core strength and trunk muscle strength. The study followed a pre–post intervention approach, where outcome measures were recorded before and immediately after a single exercise session. This design was chosen to determine acute neuromuscular changes resulting from the intervention.

Participants

A total of 43 healthy individuals aged between 18 and 30 years were recruited using a convenience sampling method. Participants were selected from a general population of students and young adults who were willing to participate in the study. Prior to inclusion, all participants were screened to ensure they met the eligibility criteria.

The inclusion criteria were: absence of any musculoskeletal injury in the past six months, no known neurological or cardiopulmonary disorders, and the ability to perform moderate physical activity without discomfort. Participants were excluded if they reported current pain, had any spinal deformities, recent fractures, or had undergone surgery in the recent past. All participants provided informed consent prior to participation, and the study adhered to standard ethical guidelines for human research.

Outcome Measures

Two primary outcome measures were assessed in this study:

Core Strength: Core strength was evaluated using a standardized endurance-based assessment, specifically the plank hold test. Participants were instructed to maintain a neutral spine position while supporting their body weight on their forearms and toes. The duration for which the position could be held

without compromising form was recorded in seconds. This test is widely used as a reliable indicator of core muscle endurance and stability.

Trunk Muscle Strength: Trunk muscle strength was assessed using trunk flexor and extensor endurance tests. For trunk flexor endurance, participants maintained a seated position with the trunk inclined at a specific angle, while for trunk extensor endurance, participants held the upper body unsupported in a prone position. The duration for which each position was maintained was recorded. These tests are considered valid and reliable measures of trunk muscle performance.

Procedure

Baseline measurements for both core strength and trunk muscle strength were recorded prior to the intervention. Participants were given standardized instructions and demonstrations to ensure uniformity in testing procedures. Adequate rest was provided between tests to avoid fatigue.

Following baseline assessment, participants underwent a structured session of oblique sling exercises designed to activate both anterior and posterior myofascial sling systems. The exercise protocol consisted of three sets of ten repetitions for each exercise, with a rest interval of 60 seconds between sets to prevent excessive fatigue.

Fig. 1 Bird Dog Exercise

The exercise regimen included alternated bilateral bird-dog exercise emphasizing diagonal limb movement to engage the oblique sling system. All exercises were performed under supervision to ensure correct technique, posture, and movement control.

Immediately after completing the exercise session, post-intervention measurements were recorded using the same standardized procedures as the baseline assessment. This allowed for direct comparison of pre- and post-exercise values to determine the immediate effects of the intervention.

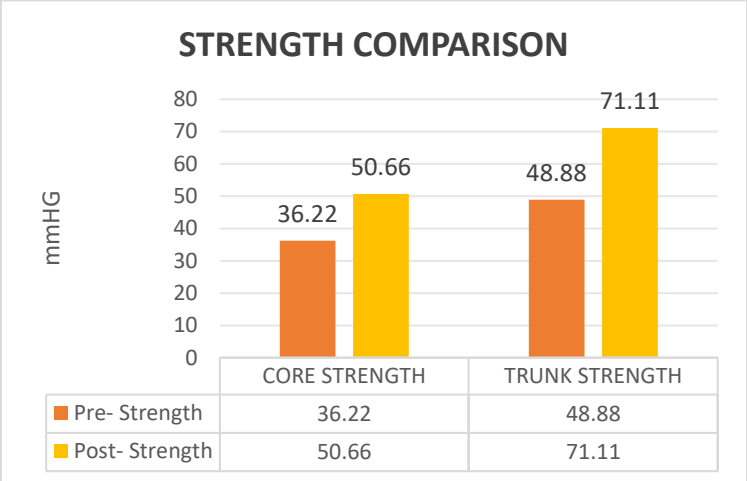
Statistical Analysis

The collected data were analyzed using MEDCALC. Pre- and post-intervention values were compared using paired t-tests to determine the significance of changes in core and trunk muscle strength. A p-value of less than 0.05 was considered statistically significant

Result

The sample had a mean age of 22 years. The mean height of the participants was 159.11 cm with a standard deviation of 7.83 cm while the mean weight was 57.56 with a standard deviation of 12.19. BMI was 22.13 ± 3.47.

Fig. 2: Core and Trunk Strength Comparison



A statistically significant improvement was observed in core strength ($p = 0.01$) as well as in trunk muscle strength ($p = 0.03$).

Discussion

The present study investigated the immediate effects of oblique sling exercises on core and trunk muscle strength in healthy individuals. The findings revealed significant improvements in both parameters, with a greater effect observed in core musculature.

The improvement in core strength can be attributed to enhanced activation of deep stabilizing muscles, particularly the transversus abdominis and multifidus. These muscles play a key role in maintaining spinal stability and are often targeted in core stabilization programs (10). The diagonal and rotational nature of oblique sling exercises likely facilitates greater neuromuscular recruitment through proprioceptive feedback and coordinated muscle activation.

The posterior and anterior sling systems contribute to force transmission across the body during functional movements such as walking, running, and lifting (11). Activation of these chains improves intermuscular coordination and dynamic stability, which may explain the observed improvements in trunk muscle performance.

The greater improvement in core strength compared to trunk strength suggests that sling-based exercises may preferentially target deep stabilizers rather than superficial muscles. This is consistent with previous studies indicating that functional, multi-planar exercises are more effective in activating core musculature compared to isolated strengthening exercises (12).

From a clinical perspective, the immediate effects observed in this study have important implications. Physiotherapists can incorporate oblique sling exercises into warm-up routines or early rehabilitation phases to enhance neuromuscular activation and prepare patients for functional tasks.

Future Recommendation

Future studies should include larger sample sizes, clinical populations, and long-term follow-up to assess sustained effects.

Conclusion

A single session of oblique sling exercises results in significant immediate improvements in both core and trunk muscle strength, with a more pronounced effect on core musculature. These findings highlight the effectiveness of sling-based exercises in enhancing neuromuscular coordination, stability, and postural control.

Oblique sling exercises can be effectively incorporated into physiotherapy and fitness programs to improve functional performance and prevent injury.

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